REMARKS

No claims are being cancelled. Claims 19 and 20 are being added. No claims are being amended. Upon entry of this amendment, claims 1-4, 6-13 and 15-20 will be pending in the application.

The rejection of claims 1-18 under 35 U.S.C. §103(a).

Claims 1-18 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,852,999 to Wright in view of U.S. Patent No. 6,624,539 to Hansen combined with U.S. Patent No. 4,845,450 to Porzio. More specifically, the Office communication asserts:

> Claims 1-18 are rejected under 35 USC 103 (a) as being unpatentable Wright in view of Hansen and combined with Porzio. In figure 2, Wright shows a wire bonding apparatus having a wire bonding tool #23 at one end of and amplification horn #14 and has a mounting flange #15 at the other end of the horn. The device is driven by a generic ultrasonic transducer which may include a magnetostrictive driver. Hansen teaches a high power ultrasonic transducer can have a higher efficiency by using a prestressed magnetostrictive Terfenol-D material combined with a first field generator to provide a bias field and a second field generator to provide a magnetic drive field. Porzio (note figure 5 and column 5 lines 40-52) teaches a further enhanced output can be obtained by combining the Terfenol-D (rare earth based alloy) layers with samarium cobalt layers (rare earth based alloy) separated from one another by a layer of epoxy (passive all-America material). It has long been held that selection from among known, suitable materials is within the skill expected at the routineer. Thus, to select the specific well known magnetostrictive materials used by Porzio in the giant magnetostrictive arrangement of Hansen and place it into the generic system of Wright in order to provide a predictable increase in power and efficiency would have been obvious to one of ordinary skill in the art.

As stated in MPEP §2143, to establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or

references when combined) must teach or suggest all the claim limitations.

Claim 1 recites:

> 1. A bonding apparatus for a wire bonding machine comprising:
> a bonding tool coupled to an ultrasonic transducer, said transducer comprising:
> a giant magnetostrictive element,
> a fastener for holding the giant magnetostrictive element under mechanical pressure,
> a first field generator for providing a magnetic bias field,
> a second field generator for providing a magnetic drive field, and
> a magnetic circuit for channeling the magnetic fields in the giant magnetostrictive element, wherein said giant magnetostrictive element is a composite comprising two or more rare-earth-based alloy parts separated from one another by a layer of passive polymeric material.

- All of the claimed features are not found in the cited references.

Claim 1 recites in one pertinent part "a fastener for holding the giant magnetostrictive element under mechanical pressure." The Wright reference indicates that the transducer 14 is held by way of collar 15 (Col. 2, lines 7-20). There is nothing in the Wright reference that indicates that the giant magnetostrictive element is held under mechanical pressure by a fastener. The Hansen reference indicates that the Belville spring 126 creates a longitudinal pre-load on the dry rod 42 (See Col. 15, lines 45-46). The Office Communication does not indicate where Applicant's fastener for holding the giant magnetostrictive element under mechanical pressure can be found in the cited references.

Claim 1, and claims dependent therefrom, are not obvious over the cited references and are patentable for at least this reason. Claim 10 recites similar features so that it, and claims dependent therefrom, are also patentable for at least this reason.

- There is no suggestion or motivation to combine the Wright and Hansen references.

A reference that teaches away from a claimed invention does not provide the suggestion or motivation needed to anticipate or make obvious a claimed invention. In fact, the courts have stated that a reference that teaches away from a claimed invention is an indication of the nonobviousness of that invention. "A reference, however, must have been considered for all it taught, disclosures that diverged and taught away from the invention at hand as well as disclosures that pointed towards and taught the invention at hand." Ashland Oil, Inc. v. Delta resins & Refractories, Inc., 227 USPQ 657, 666 (Fed. Cir. 1985). "One important indicium of nonobviousness is 'teaching away' from the claimed invention by the prior art." In re Braat, 16 USPQ2d 1813, 1814 (Fed. Cir. 1990). The prior art reference must be considered in its entirety, including portions that would lead away from the claimed invention. See MPEP 2141.02. A "reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the Applicant." Winner v. Wang, 202 F.3d 1340 (Fed Cir. 2000) citing Gurley at 553.

The Wright reference is directed to an impedance measuring network which is set out in the context of an ultrasonic transducer for providing welds between miniature members such as what are bonding contracts of integrated circuits (Col. 2, lines 9-14). The Wright reference indicates that the wires may be on the order of 0.0005 to 0.001 inches (Col. 2, line 62). The Wright reference indicates that this application uses "high frequency electrical energy" such as in the range of 60 kHz (Col. 2, lines 35-36).

The Hansen reference is directed to high power ultrasonic transducers. In fact, the Hansen reference explicitly indicates that the transducers therein are "capable of providing about 30 kilowatts of electrical energy at about 20 kHz (Col. 2, lines 32-34). In fact, the Hansen reference indicates that transducers therein can maintain the 30 kilowatt output under continuous operation for many days. The Hansen elements provide substantially more power than would be needed, or desired, to weld the leads in an integrated circuit at a substantially lower frequency than disclosed in the Wright

reference. Thus, there is no suggestion or motivation to use the extremely high power and low frequency elements of Hansen in the low power, high frequency integrated circuit welding apparatus set out in Wright. Claims 1-18 are not obvious over the cited references and patentable for at least this reason.

Furthermore, there are no problems with the ultrasonic transducer in the Wright apparatus, thus, there is no motivation for a skilled practitioner to improve or modify it. Wright does not supply or suggest a motivation or the desirability of modifying its teachings in the way suggested by the Examiner. The fact that reference teachings can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP 2143.01 *In re Mills*, 916 F.2d 680 (Fed. Cir. 1990). Because the combination of references fail to disclose or suggest a motivation to combine the reference apparatus to arrive at the present application, the Examiner's obviousness rejection should be withdrawn. Claims 1-18 are not obvious over the cited references and patentable for at least this reason.

In the Porzio reference, Fig. 5 and Col. 5, lines 40-52 teach that "[e]ach magnetostrictive (Terfenol-D) slab has plane parallel faces produced by cutting, and the cut pieces are assembled to form a slightly elliptical shape using an electrical insulative adhesive". It is important to note that Porzio teaches the use of mechanical cutting for an originally shaped (cylindrical shape here) monolithic magnetostrictive rod in the longitudinal direction to produce parallel faced magnetostrictive pieces, which are then adhered/assembled to form a slightly elliptical shape. This turns out an important limitation/drawback of the Porzio reference in that the magnetostrictive Terfenol-D/adhesive rod is ONLY produced with a distorted shape (here a slightly elliptical shape rather than a cylindrical shape). However, Applicant's invention produces any desired shape by molding finite-sized magnetostrictive particles into a shape with the desired shape and dimensions. Obviously, the use of a shape-distorted magnetostrictive bar would reduce the performance of that device compared to a non-distorted

magnetostrictive bar. Further, Porzio's technique has other significant limitations and drawbacks including higher raw material costs, higher material fabrication costs, lower/very limited shape and size novelties, lower operational bandwidths, etc. as compared with Applicant's invention. In conclusion, Porzio follows the general rule of designing and fabricating magnetostrictive rod from large monolithic material with desired shape (top-down approach), while Applicant's fabricate the magnetostrictive rod via micro-fabrication technology (down-top approach). Claims 1-18 are not obvious over the cited references and patentable for at least this reason.

In summary, Applicants have addressed each of the objections and rejections within the present Office Action. It is believed the application now stands in condition for allowance, and prompt favorable action thereon is respectfully solicited.

The Examiner is invited to telephone Applicant(s)' attorney if it is deemed that a telephone conversation will hasten prosecution of this application.

Respectfully submitted,

Siu Wing Or et al

By: _____
James E. Piotrowski
Registration No. 43,860
Alix, Yale & Ristas, LLP
Attorney for Applicants

Date: April 10, 2007
750 Main Street- Suite 1400
Hartford, CT 06103-2721
(860) 527-9211

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